Claims

1. A SAW filter comprising a piezoelectric substrate, and at least two inter-digital transducers disposed in proximity to each other on the same surface acoustic wave propagation path on the piezoelectric substrate,

wherein at least one of the inter-digital transducers is a first inter-digital transducer connected serially to a signal path, and at least one is a second inter-digital transducer connected between the signal path and a ground,

wherein the first inter-digital transducer and the second inter-digital transducer are different in resonance frequency, and the first inter-digital transducer and the second inter-digital transducer are formed by such a configuration that electrode fingers of comb-shaped electrodes configuring inter-digital transducers are arranged almost continuously.

2. The SAW filter of Claim 1,

wherein the first inter-digital transducer and the second inter-digital transducer are arranged in such a manner that respective surface acoustic waves are not negated.

3. The SAW filter of Claim 2,

wherein the first inter-digital transducer and the second inter-digital transducer are configured so as to fall

in reversed phases each other.

4. The SAW filter of Claim 1,

wherein resonance frequencies of the first inter-digital transducer and the second inter-digital transducer are set up to frequency necessary for obtaining a preset filter characteristic.

5. The SAW filter of Claim 4,

wherein resonance frequency of the first inter-digital transducer is nearly matched with anti-resonance frequency of the second inter-digital transducer.

6. The SAW filter of Claim 1,

wherein a reflector electrode is disposed on the outermost side of the inter-digital transducer including the first inter-digital transducer and the second inter-digital transducer.

7. The SAW filter of Claim 1 or 6,

wherein a strip line electrode is disposed between the first inter-digital transducer and the second inter-digital transducer, and it is configured in such a manner that electrode fingers of comb-shaped electrodes which configure the first inter-digital transducer and the second inter-digital

transducer, and electrode fingers which configure the strip line electrode or the reflector electrode are arranged so as to be located almost continuously.

8. The SAW filter of Claim 7,

wherein a pitch of the electrode fingers of the strip line electrode is set up to one between a pitch of the electrode fingers of the first inter-digital transducer and a pitch of the electrode fingers of the second inter-digital transducer.

9. The SAW filter of Claim 1,

wherein a pitch of plural electrode fingers, which are arranged in a boundary area of the first inter-digital transducer and the second inter-digital transducer, is differentiated from a pitch of electrode fingers which are arranged in respective center areas.

10. The SAW filter of Claim 9,

wherein weighting method is applied to at least one of the inter-digital transducers which configure the SAW filter.

11. The SAW filter of Claim 10,

wherein apodized weighting method is applied to at least one of the inter-digital transducers which configure the SAW filter.

12. The SAW filter of Claim 10,

wherein thinning-out weighting is applied to at least one of the inter-digital transducers which configure the SAW filter.

13. The SAW filter of Claim 1,

wherein the inter-digital transducers, which configure the SAW filter, are of a configuration including dummy electrodes.

14. The SAW filter of Claim 1,

wherein a third inter-digital transducer, which is connected between a signal path and a ground, is arranged in proximity to an opposite side to such a side that the second inter-digital transducer is arranged in proximity to the first inter-digital transducer.

15. The SAW filter of Claim 14,

wherein resonance frequency of the third inter-digital transducer is different from resonance frequency of the first inter-digital transducer.

16. The SAW filter of Claim 1,

wherein a fourth inter-digital transducer, which is

connected serially to a signal path, is arranged in proximity to an opposite side to such a side that the first inter-digital transducer is arranged in proximity to the second inter-digital transducer.

17. The SAW filter of Claim 16,

wherein resonance frequency of the fourth inter-digital transducer is different from resonance frequency of the second inter-digital transducer.

18. A SAW filter configured in such a manner that the SAW filter of Claims 1 through 17 is used as one SAW element and the elements are connected in multiple stages.